

Closed loop ground source heat pump system
design parameters & estimate comparison checklist

1.00	Estimate Details	Estimate validity		days	
1.01		Payment Terms		days from invoice	
1.02		Design, supply and install & commission boreholes, header pipes, supply and commission heat pump(s) <i>(see estimate for detail)</i>		£ Exc. vat	
1.03		Options available			
2.00	Typical Lead in times <i>(subject to confirmation at time of order)</i>	Detailed design		weeks	
2.01		Drilling		weeks	
2.02		Horizontal header work		weeks	
2.03		Supply of heat pump		weeks	
2.04		Commissioning		weeks	
3.00	Programme	Borehole installation		weeks	
3.01		Header pipe installation		weeks	
3.02		Heat pump installation		weeks	
3.03		Commissioning		days	
4.00	Thermal modeling	Peak heating design load		kW _(thermal)	
4.01		Peak cooling design load		kW _(thermal)	
4.02		Annual kWh heating load		MWh/pa	
4.03		Annual kWh heating load		MWh/pa	
4.04		Ground thermal conductivity used for modeling purposes		W/m/K	
4.05		Software used for modeling		version	
4.06		Minimum entering water temperature allowed in modeling		°C	
4.07		Maximum entering water temperature allowed in modeling		°C	
4.08		Assumed Borehole thermal resistance		°K/(W/m)	
4.09		Assumed undisturbed ground temperature		°C	
4.10		Required number of boreholes		Nr	
4.11		Depth of boreholes		m	
4.12	Spacing between boreholes		m		
5.00	Hydraulic design	Ground loop flow rate		L/sec	
5.01		U-tube diameter		mm OD	
5.02		Borehole turbulence <i>(Note IGSHPA best practice recommends re number in excess of 2100 to be used)</i>		Re	
5.03		Ground loop heat exchanger total pressure drop <i>(Note IGSHPA best practice recommends total pressure drop should not exceed 50kPa)</i>		kPa	
5.04		Borehole manifolding arrangement	Reverse Return		Y/N
5.05			Valved manifolds		Y/N
		Note – Valved manifolds should be used as in the event of any mechanical pipe trauma, individual boreholes can be isolated thus allowing the system to function at reduced capacity. Pipe trauma to a Reverse return arrangement would lead to the entire heat exchanger being decommissioned until repairs could be effected			

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6.00	Heat pump specification	Number of heat pumps				
6.01		Manufacturer				
6.02		Area of manufacturing origin				
6.03		Refrigerant		Refrigerant charge		
6.04		Minimum entering water temperature			°C	
6.05		Maximum entering water temperature			°C	
		<i>(Note heat pumps with minimum entering water temperature greater than -5°C are not suitable for closed loop operation)</i>				
6.06		Design CoP		At operating parameter		
6.07		Design EER		At operating parameter		
		<i>Note CoP and EER should be quoted at parameters which match building distribution and ground loop design parameters</i>				
7.00	System operation	Heating	Y/N	Full / Partial	Building load	
7.01		Cooling	Y/N	Full / Partial	Building load	
7.02		Heating Modulation				
		Cooling Modulation				
7.03		Supplementary heating required to meet building load				Y/N
7.04		Supplementary cooling required to meet building load				Y/N
7.05		Maximum design output temperature				°C
7.06		Minimum design output temperature				°C
7.07	Heating flow and return temperature difference delta T				°C	
8.00	Ground loop exchanger Design Standards	Complies with IGSHPA best practice			Y/N	
8.01		Complies with BSEN 15450			Y/N	
8.02		Complies with GSHPA Technical Standards			Y/N	
8.03		Complies with MCS Standards			Y/N	
9.00	Insurances	Public & Products Liability				
9.01		Professional Indemnity				
9.02		Contractors all risk				
9.03		Employers Liability				
10.01	Membership / Accreditation	MCS				
10.02		Real code of practice				
10.03		CHAS				
10.04		NAPIT				
10.05		Construction Line				
10.06		IGSHPA				
10.07		GSHPA				